

## CLAIMS

I claim:

1. A shaft seal assembly (10), comprising:  
an annular carrier (14);  
a radially acting annular shaft seal element (16) mounted on said carrier (14) for encircling a rotating shaft (13) to be sealed; and  
an annular felt washer (18) fixed to said carrier (14), such that said carrier (14), said shaft seal element (16) and said felt washer (18) are unitized.
2. A shaft seal assembly (10) as set forth in claim 1 wherein said shaft seal element (16) includes a laydown seal member (48) fabricated of polytetrafluoroethylene for axially bending to extend along the shaft (13).
3. A shaft seal assembly (10) as set forth in claim 1 including an annular retainer (20) for retaining said shaft seal element (16) in engagement with the shaft (13).
4. A shaft seal assembly (10) as set forth in claim 3 wherein said retainer (20) is integral with said carrier (14).
5. A shaft seal assembly (10) as set forth in claim 4 wherein said washer (18) is fixed by adhesion to said carrier (14).

6. A shaft seal assembly (10) as set forth in claim 1 wherein said washer (18) is fixed by adhesion to said carrier (14).

7. A shaft seal assembly (10) as set forth in claim 1 wherein said shaft seal element (16) includes a laydown seal member (48) fabricated of polytetrafluoroethylene for axially bending to extend along the shaft (13) and a radial lip member (50) fabricated of rubber and extending in axially and radially spaced relation to said laydown seal member (48) to engage the shaft (13).

8. A seal assembly (10) as set forth in claim 3 wherein said carrier (14) includes an inner case (26) and an outer case (28) extending in axially and radially spaced relation to one another to define a recess (30) therebetween for receiving said retainer (20) to maintain said shaft seal element (16) in engagement with the shaft (13).

9. A seal assembly (10) as set forth in claim 8 and including a retaining portion (72) extending from said retainer (20) into said recess (30) for retaining said retainer (20) in engagement with a bore (12) through which the shaft (13) extends.

10. A seal assembly (10) as set forth in claim 9 wherein said retaining portion (72) engages said laydown seal member (48).

11. A seal assembly (10) as set forth in claim 9 wherein said retaining portion (72) engages said laydown seal member (48) and said lip member (50).

12. A seal assembly (10) as set forth in claim 9 wherein said retaining portion (72) is wedged between said laydown seal member (48) and said lip member (50).

13. A seal assembly (10) as set forth in claim 9 wherein said retainer (20) includes an inner edge (22) and said retaining portion (72) includes a cylindrical wall (82) extending perpendicularly from said inner edge (74) toward said lip member (50) to an interior edge (84).

14. A seal assembly (10) as set forth in claim 13 wherein said retainer (20) includes an outer edge (76) with a plurality of spaced peripheral tabs (78) extending therefrom for engaging the bore (12).

15. A seal assembly (10) as set forth in claim 13 wherein said retaining portion (72) includes a plurality of spaced spring tabs (86) extending at an acute angle from said interior edge (84) into said recess (30) to engage said laydown seal member (48).

16. A seal assembly (10) as set forth in claim 15 wherein said interior edge (84) engages said lip element (50) to wedge said spring tabs (86) between said laydown seal member (48) and said lip member (50).

17. A seal assembly (10) as set forth in claim 3 wherein said washer (18) includes an annular flange (88) axially underlying said retainer (20)

18. A seal assembly (10) as set forth in claim 9 wherein said washer (18) includes an annular flange (88) extending axially under said retaining portion (72) to said lip member (50).

19. A seal assembly (10) as set forth in claim 18 wherein said flange (88) engages said retaining portion (72) to wedge said retaining portion (72) between said laydown seal member (48) and said lip member (50).

20. A seal assembly (10) as set forth in claim 19 wherein said cylindrical wall (82) is secured to said flange (88).

21. A shaft seal assembly (10), comprising:

- an annular carrier (14);
- a radially acting annular shaft seal element (16) mounted on said carrier (14) for encircling a rotating shaft (13) to be sealed;
- an annular retainer (20) integral with said carrier (14) for retaining said shaft seal element (16) in engagement with the shaft (13) and including an inner edge (74) and an outer edge (76) having a plurality of spaced peripheral tabs (78) extending therefrom for engaging a bore (12) through which the shaft (13) extends;
- said shaft seal element (16) including a laydown seal member (48) fabricated of polytetrafluoroethylene for axially bending to extend along the shaft (13) and a radial lip member (50) fabricated of rubber;
- said carrier (14) including an inner case (26) and an outer case (28) extending in axially and radially spaced relation to one another to define a recess (30)

therebetween for receiving said retainer (20) to maintain said shaft seal element (16) in engagement with the shaft (13);

a retaining portion (72) extending from said retainer (20) into said recess (30) and wedged in engagement between said laydown seal member (48) and said lip member (50) for retaining said retainer (20) in engagement with the bore (12);

said retaining portion (72) including a cylindrical wall (82) extending perpendicularly from said inner edge (84) toward said lip member (50) to an interior edge (84) engaging said lip member (50) for wedging said spring tabs (86) between said laydown seal member (48) and said lip member (50);

a plurality of spaced spring tabs (86) extending at an acute angle from said interior edge (84) into said recess (30) to engage said laydown seal member (48); and

an annular felt washer (18) fixed by adhesion to said carrier (14), such that said carrier (14), said shaft seal element (16) and said felt washer (18) are unitized, and including an annular flange (88) engaging said retaining portion (72) and extending axially thereunder to said lip member (50) for wedging said retaining portion (72) between said laydown seal member (48) and said lip member (50).